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E. P.

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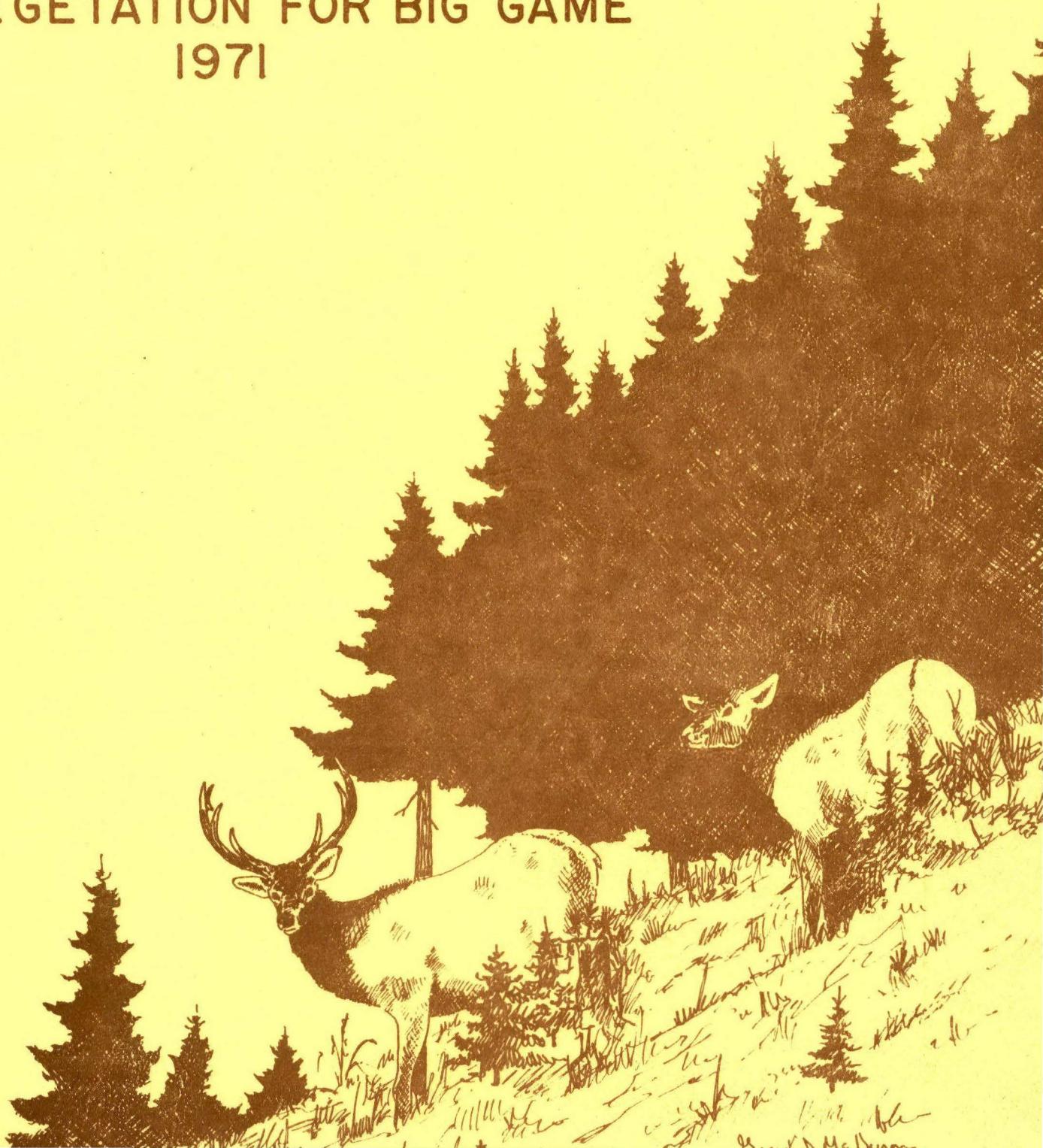
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VILLAMETTE

National Forest

CLASSIFICATION AND ANALYSIS OF VEGETATION FOR BIG GAME

1971



WILLAMETTE NATIONAL FOREST

Classification and Analysis
of Vegetation for
Coordinating Forest Cover Removal
with Wildlife Needs

By

Edmund P. Harshman

July 1971

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Acknowledgements

The method of managing forest land for wildlife described in this paper is based upon the work of many people. It started with a meeting in 1965 between Felix Smith, Bureau of Sport Fisheries and Wildlife; Bill Lawrence, Weyerhaeuser Company; and the author. It incorporated the work of E. Reade Brown (Black-tailed Deer of Western Washington), Carl Anderson (Vegetation Stages on the Olympic National Forest), and Jerry Kettunen (Sustain Acreage Cut on the Oakridge R.D. Winter Range).

Since July 1969, it has been tested and developed by the personnel on the Willamette N.F., Blue River R.D., Bruce Mateer and Jim Nielsen; Sweet Home R.D., Dick Harlan; Detroit R.D., Ed Whitmore and Al Gardner; Lowell R.D., Dick Lilja; McKenzie R.D., Bob Schramek and Dave Predeek; Oakridge R.D., Don Culver, Dave Yates and Steve English; Rigdon R.D., Tom Condron; and Game Biologists from the Oregon State Game Commission, Bob Jubber, Harold Sturgis, Jim Heintz and Francis Ives.

The future of a classification and analysis method is unlimited. It can become part of the Total Resource Information System and connected to a computer map maker so that a land manager can determine beforehand what effect his land management decisions will have on wildlife.

EDMUND P. HARSHMAN
Range & Wildlife
Willamette National Forest

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TABLE OF CONTENTS

	<u>Page</u>
CHAPTER I - INTRODUCTION	1
CHAPTER II - CLASSIFICATION OF VEGETATION FOR BIG GAME ON WILLAMETTE NF	4
Classification Criteria	
Group I - Conifer Overstory	5
Group II - Hardwoods	7
Group III - Natural Vegetation Openings	8
Group IV - Nonproductive Areas	9
Mapping	10
CHAPTER III - ANALYSIS OF VEGETATION FOR ECOLOGICAL CHANGES AND INCORPORATION INTO THE TOTAL RESOURCE INFORMATION SYSTEM	12
List of Equipment for Circular Plots	12
Instructions for Completing the Vegetation Analysis Plot Form	13
Instructions for Completing Vegetation Analysis Summary Sheet	16
Instructions for Completing Per Acre Description of Vegetation	18
CHAPTER IV - PARTIAL LIST OF PLANT SPECIES ON THE WINTER RANGE IN THE WILLAMETTE N.F.	21
Trees	21
Shrubs	21
Forbs	22
Grasses	22

Tables and Figures

	<u>Page</u>
Table 1 - Deer Equivalent	3
Table 2 - Color Classification Code	11
Table 3 - Percent Cover - Diameter Relationships	14
Table 4 - Number of Plants by Diameter to Equal 1%, 3%, 5%, 7%, or 10% on 1/250 Plot	23
Figure 1 - Graph of Acres by Ages for Winter Range	
Figure 2 - Twenty Years of Regeneration Cut @ 1% Per Year for Rotation Age of 100 Years	
Figure 3 - Idealized Acreage Balance @ 1% Area Cut Per Year . .	
Figure 4 - Map Form 5400-11A	
Figure 5 - Vegetation Analysis Plot Form	
Figure 6 - Vegetation Analysis Summary Form	
Figure 7 - Per Acre Description of Vegetation Form	
Figure 8 - TRI Form R6-6600-601	

CHAPTER I

INTRODUCTION

The following method of coordinating removal of forest cover with wildlife needs is designed to aid in reaching the National Forest goal of providing a sustained amount of forage and cover for big game. The critical period for big game and other animals on the Willamette National Forest is during the winter months from December to April. The winter range is dominated by various Douglas-fir associations and creation of food is therefore dependent upon removal of the trees. This removal can be brought about by: fire, windstorms, insects or man. To benefit wildlife or to provide for a sustained number of animals, the removal of the forest cover must be programmed to provide a sustained amount of forage producing areas and in close proximity to cover so that the forage can be used.

Forested lands designated for commercial harvesting (on sustained yield basis) provide the best opportunity for coordinating timber harvest with wildlife needs. Those areas designated for no cutting, such as landscape management units will be considered in development of a coordinated harvest plan. Because of their location, these areas provide additional places for the animals to subsist during periods of extremely deep snows.

In addition there are key areas (meadows and hardwood swamps) within the Forest that should not be negatively influenced by man's activities such as clearcutting, recreation developments, roads, and dams.

The procedure for developing a coordinated plan of timber harvesting with wildlife needs is:

1. Determine the winter (or critical) period by on the ground looks and data from the Oregon State Game Biologists. On the west side of the Cascades this job is difficult because of the wide variation of the snow depth during the winter and between winters.

Also, it is imperative that this winter range is delineated on the multiple use map and incorporated into the plan.

2. Classify, as outlined in Chapter II, the winter range by vegetative types or cells. (Refer also to Total Resource Information System (TRI), Forest Service Handbook 2109.20 R6).
3. Prepare a map of the winter range showing the location of each cell and its classification. With the assistance of the Oregon State Game Commission Game Biologist, develop an overlay showing travel routes and areas needing special considerations (i.e., meadows, swamps, etc.).

4. Determine the acreage for each classification with the use of the TRI printout. Prepare graphs showing (1) the present allocation of each classification, (2) an "idealized situation" and (3) 20 years from now under present harvest plans. (Figures 1, 2 and 3). The ideal situation is based on a 100-year rotation with a cut of 1% of the area each year. Thus, each cell will be in a classification stage for certain length of time.
5. The next step is analyzing vegetation to determine ecological succession, site index and growth basal area. This method is outlined in Chapter III. It will take well-trained personnel and several years to develop this data, but then the land manager can make better decisions on how to manage each acre for growing timber and wildlife.
6. The final step will be to plan, with the Timber Management Assistant, the type, location, size, shape and timing of the harvest areas. An aid to achieve better balance of forage is to program cuts by using the deer equivalent chart. (Table 1) A deer equivalent is amount of forage required to feed one deer for one year (one elk equals 3.5 deer).

Compare the present situation graph and the 20-years graph with the idealized graph to determine if you are meeting the sustained yield of forage and cover for the area under management. If not, program to cut in the CN-4 because thinning in these stands can increase the deer equivalents both in number and location.

Deer equivalents in Table 1 are suitable for Oakridge, Rigdon and Blue River Districts, but reduce by 10% for McKenzie and Lowell Districts, and 20% for Sweet Home and Detroit Districts.

Table 1 - Deer Equivalent

CN-1	= 60 per section (640 acres) or 1 per 10 acres/year
CN-2	= 210 per section (640 acres) or 1 per 3 acres/year
CN-3	= 168 per section (640 acres) or 1 per 4 acres/year
CN-4-20	= 10 per section (640 acres) or 1 per 64 acres/year
CN-4-50	= 16 per section (640 acres) or 1 per 40 acres/year
CN-4T	= 32 per section (640 acres) or 1 per 20 acres/year
CN-4-90	= 911 per section (640 acres) or 1 per 20 acres/year
CN-4R	= 40 per section (640 acres) or 1 per 16 acres/year
CN-5	= 32 per section (640 acres) or 1 per 20 acres/year
CN-5S	= 40 per section (640 acres) or 1 per 16 acres/year
CN-5P	= 45 per section (640 acres) or 1 per 14 acres/year
HD-S	= 60 per section (640 acres) or 1 per 10 acres/year
HD-B	= 320 per section (640 acres) or 1 per 2 acres/year
HD-RB	= 5 per section (640 acres) or 1 per 130 acres/year
HD-RV	= 16 per section (640 acres) or 1 per 40 acres/year
HD-H	= 16 per section (640 acres) or 1 per 40 acres/year
NO-G	= 100 per section (640 acres) or 1 per 7 acres/year
NO-M	= 320 per section (640 acres) or 1 per 2 acres/year
NO-BG	= 40 per section (640 acres) or 1 per 16 acres/year
NO-B	= 320 per section (640 acres) or 1 per 2 acres/year

These figures are for the midpoint in ecological succession;
thus, interpolate if between stages.

CHAPTER II

CLASSIFICATION OF VEGETATION FOR BIG GAME ON WILLAMETTE NF

Classification is based on the ecological succession of the dominant vegetation or lack of vegetation on management cells (TRI system) and is made up of four groups.

Group 1 - Conifers: The dominant plant cover in the cell is or soon will be conifers. The group is divided into five parts, based on the needs of the big game for food and cover as they relate to the various ecological stages. These are:

1. Amount of production of available forage for deer and/or elk.
2. The amount of sunlight reaching forage plants.
3. Animal acceptability; i.e., how much it is used and when.
4. Hunter usability; i.e., amount and duration of use by hunters.
5. Harassment factor indicates the ease of forcing the animals from the cell.

Group II - Hardwoods: These are cells which are dominated by hardwoods and will not soon be replaced by conifers.

Group III - Natural Vegetation Openings: The dominant cover is vegetation other than trees (or they are excluded, as under powerlines). When necessary, permanent brush fields can be placed in their own group.

1. Types of openings: glades, prairies, meadows, grassy swamps, brush fields, large powerlines, shallow ponds with vegetation, etc.
2. The mapping of openings will include those with scattered conifer overstory such as burns, on which conifer regeneration and growth is slow.
3. These openings should also be mapped outside the winter range because they are key areas for westside big game populations and deserve special management considerations.

Group IV - Nonproductive Areas: Vegetation is virtually nonexistent. These are areas which are nonproductive for deer and elk; i.e., rock slides, cliffs, lakes, ponds with little or no vegetation, barren sheep bed grounds, lava fields, cinder pits, etc.

Group I - Conifer Overstory

<u>Map Symbol</u>	<u>Description</u>
CN-1	<p><u>Conifers - First</u> wildlife ecological stage (less than 10% of conifer crown cover remains after removal).</p> <p>Dominant vegetative cover varies from none to a complete cover of short lived plants (i.e., fireweed, bull thistles, etc.) and sprouts from shrubs such as vine maple. Forage production will vary from very low to moderate. Animal acceptance is good because of the new tender growth. Hunter road use is high but of short duration. Harassment factor is very high. Deer equivalent = 60 per section (640 acres) or one per 10 acres per year.</p>
CN-2	<p><u>Conifers - Second</u> wildlife ecological stage.</p> <p>Dominant cover is long lived herbaceous plants and/or woody vegetation below five feet in height. Available forage production for big game is at its maximum. Animal acceptance and hunter use is very high. Harassment factor is moderate for deer and high for elk. Deer equivalent = 210 per section or one per 3 acres per year.</p>
CN-3	<p><u>Conifers - Third</u> wildlife ecological stage.</p> <p>Dominant cover is entirely woody plants, either trees or shrubs or a mixture. Height of the plants is between 5 and 20 feet. Occasionally the conifers are over 20 feet but with less than 30% crown cover and shrubs are still less than 20 feet. Animal acceptance is high because of adequate food and excellent escape cover. Hunter use is high on the road; low in the unit. Harassment factor is low. Deer equivalent = 168 per section or one per 4 acres per year.</p>
CN-4 (CN-4-20) (CN-4-50)	<p><u>Conifers - Fourth</u> wildlife ecological stage.</p> <p>Dominant cover is conifer trees with an 80%-100% crown closure. Can be any height but usually over 20 feet. Very little light reaches the ground. Ground cover is sparse and composed of tolerant plant species; i.e., vine maple, sword fern, salal, Oregon grape, vanilla leaf, etc. Forage production, hunter use and harassment factor are all at their lowest points. Animal acceptability is also low, except for cover and periods of deep snow and hunting season. Deer equivalent = 10 per section or one per 60 acres per year for 20-year old stand and 16 per section or one per 40 acres for a 50-year old stand.</p>

CN-4T

Conifers - Fourth wildlife ecological stage (thinned by man or nature)

Dominant cover is conifer trees that have been thinned but with 50 to 80% crown cover remaining. The herbaceous and shrub cover is composed of the species present before thinning. Forage production and nutrient level of the plants is low. Animal acceptability as cover is good and is used heavily during hunting season and deep snow in clearcuts. Foot hunter use is high on skid trails. Harassment factor is low. Deer equivalent = 32 per section or one per 20 acres per year. An unthinned 90-year old stand (CN-4-90) will also have the same deer equivalent.

CN-4R

Conifers - Fourth wildlife ecological stage (removed by man or nature or naturally open grown stands)

Dominant cover is conifer trees with 10% to 50% crown cover remaining. Animal acceptability and harassment factor is moderate. Hunter use is moderate for motorbikes, but high for the foot hunter. Deer equivalent = 40 per section or one per 16 acres per year.

CN-5

Conifers - Fifth wildlife ecological stage.

Dominant cover is mature or overmature timber stands. Bottom of dominant tree crowns are over 100 feet high. The crown cover is usually around 70%. Sunlight reaches the ground and nutrient value of the forage is moderate. Animal acceptance, hunter use and harassment factor are also moderate. Deer equivalent = 32 per section or one per 20 acres per year. This stage also includes two story or an all-age stand.

CN-5S

Conifers - Fifth wildlife ecological stage (salvage logged)

Same as CN-5, except has had salvage logging. Skid trails will increase hunter use and harassment factor. Planting of palatable grasses and legumes will increase high quality food, thus better fawn and calf survival. Deer equivalent = 40 per section or one per 16 acres per year.

CN-5P

Conifers - Fifth wildlife ecological stage (prelogged)

Same as CN-5S except has been prelogged for removal of small diameter trees. A very temporary situation of one to two years. Deer equivalent = 45 per section or one per 14 acres per year.

Group II - Hardwoods

<u>Map Symbol</u>	<u>Description</u>
HD-S	<u>Hardwood Swamp</u> - Dominant cover is deciduous, water tolerant, woody vegetation, usually a combination of one or more of the following; alder, Douglas maple, cottonwood or willow. These plants grow in clumps interspersed with wide leaf sedges, cattails, bull rushes and other bog growing plants. The slope shape is concave Forage production is moderate. Animal acceptability is good within swamp and high in the surrounding timber cover. Harassment factor is high because humans are also attracted to these areas. Hunter use is high, but of short periods because of the wet treacherous footing and poor sight distance. Deer equivalent = 60 per section or one per 10 acres per year.
HD-B	<u>Hardwood Bottom Lands</u> - Dominant cover is a combination of big leaf maples, cottonwood and alder, with occasional conifers. This type occurs in valley bottoms or along streams, most often after removal of conifers and lack of conifer reproduction. Forage production and animal acceptability is high. Hunter use is moderate. Harassment factor is low during summer and fall; high in wintertime. Deer equivalent = 320 per section or one per 2 acres per year.
HD-RB	<u>Hardwood River Bed</u> - Active flood plains. Dominant cover is small alders, willows, or cottonwoods which survive frequent floods or replace older stands which have been removed. Forage production and animal use is low as is hunter use. Harassment factor is high. Deer equivalent = 5 per 640 acres or one per 130 acres per year.
HD-RV	<u>Hardwood-Rock-Vine Maple</u> - Plant cover is vine maple and/or other shrubs growing on rock slides, lava fields, etc., and the crowns cover 40% or more of the ground. Use of the area by big game is for cover and has an estimated 16 deer equivalent per section or one per 40 acres per year.
HD-H	<u>Hardwood-Hill</u> - Dominant cover is hardwood trees such as madrone, quaking aspen, golden chinquapin, etc., occurring on sidehills. Trees are over 30 feet high with a close canopy. As cover, it is desirable for big game, but not hunters. Same food production as CN-4-50 (i.e., one per 40 acres -- see also NO-B, <u>Natural Openings-Burns</u> , and NO-BF, <u>Brush Fields</u> .)

Group III - Natural Vegetation Openings

<u>Map Symbol</u>	<u>Description</u>
NO-G	<p><u>Natural Openings-Grassland</u> - Dominant cover is grasses or sedges without subirrigation. Commonly referred to as "glades or prairies," mistakenly called "meadows." The convex slope shape and plant indicators of fescues and dryland sedge distinguishes this plant community from meadows (NO-M). Forage production is high in nutrient value for both elk and deer; however, the amount of use is not readily discernible because of the plant species taken and feeding habits of these animals. Pellet transects can give an indication of the time of use and approximate number of animal-use days per acre. Animal acceptability is extremely high. Recreation, hunter use, and the harassment factor are all very high because most of the meadows are accessible by road or trail. Deer equivalent = 100 per section or one per 7 acres per year</p>
NO-M	<p><u>Natural Openings-Meadows</u> - Dominant cover is grasses or sedges with minor cover of willow, cottonwood, lodgepole alder. Meadows are further divided by the degree of water influence and occur on a concave slope.</p>
	<p>M1 - <u>Subirrigated meadow</u> - Dominant plant species are Kentucky bluegrass, tufted hair grass or blue-joint reed grass.</p>
	<p>M2 - <u>Standing water part of the year - moist meadow</u> - The plant species are narrow leaf sedge and tufted hair grass. Around the edges, bogberry and Douglas spirea occur.</p>
	<p>M3 - <u>Many boggy and/or wet spots year around - wet meadow</u> - Plant indicators are wide leaf sedge, marsh marigold, shooting star, rushes and tules. At times, this type will be difficult to distinguish from hardwood swamp (HD-S).</p>
	<p>Forage production, hunter use, and animal acceptability are high. Deer equivalent = 320 per section or one per 2 acres per year.</p>

NO-BG	<u>Natural Openings-Bear Grass</u> - Dominant cover is bear grass. Some of these openings are the results of (a) conifer overstory removal by man, insects, or disease; (b) overgrazing of a grassland allowing an increase of bear grass; and (c) the soil type. Deer equivalent is unknown, probably low (i.e., 40 per section or one per 16 acres).
NO-B	<u>Natural Openings-Burns</u> - These are burned areas where conifer growth is sparse and will remain so for many years. Available forage production is high, as is animal acceptability and hunter use. Harassment varies with access. Deer equivalent = 320 per section or one per 2 acres per year.
NO-BF	<u>Natural Openings-Brush Fields</u> - These are areas where the soil limits the vegetation to shrubs. If the majority of the shrubs are not desirable browse species, then available forage production is low, as is animal acceptability and hunter use. Harassment factor is very low. Deer equivalent is unknown, probably very low (use CN-4 figures). If the majority of plants are desirable browse species, deer equivalent would be high, up to 210 per section or one per 3 acres.

Group IV - NONPRODUCTIVE AREAS

<u>Map Symbol</u>	<u>Description</u>
NP-W	<u>Nonproductive-Water</u> - These are areas such as lakes, reservoirs or large ponds. Drawdown areas of reservoirs which produce large amounts of forage would be classified under Group III - NO-M2.
NP-R	<u>Solid Rock</u> - In some cases, the tops of cliffs do have an attraction for animals. The dominant vegetation will determine whether it will be classified under Group I, II or III.
NP-T	<u>Talus</u> slopes, boulder fields, rock pits, etc.
NP-CL	<u>Cinders</u> or <u>lava</u> fields.
NP-S	<u>Sand</u> , gravel and/or mine tailings.
NP-U	<u>Urban</u> , or areas occupied by improvements such as recreation residences, campgrounds, organization sites, etc.

MAPPING

Field

1. Outline on TRI compartment ozalids or aerial photos the winter range.
2. Map the vegetative types or cells by the classification method on the ozalid or on the photos. At the same time obtain the following data so it can be incorporated into the Total Resource Information System. (A thorough review of FSH 2109.21R6, January 1971, is necessary to coordinate this system.)
 - (a) In CN-1, 2, & 3, Natural Openings, record on the overlay the dominant or key wildlife species by alpha name and height.
 - (b) In CN-4, 5, and Hardwoods determine and record average diameter of dominant trees.
 - (c) Date of classification
 - (d) Recommendations for revegetating with browse, grass, clover, etc. (TRI Form R6-2200-32)

Office

1. Prepare a map on a 4" mile topographic base from the aerial photos or ozalid. The maps should be updated to show the latest roads and clearcut units.

The map should show:

- (a) Winter range
- (b) Classification of the cells by color (see Table 2)
- (c) An overlay showing animal travel routes and key areas. (Consult with State Game Biologists)

2. Minimum size of areas to be mapped are:

Group I	- Conifer	= 10 acres
"	II - Hardwoods	= 10 acres
"	III - Natural Openings	= 5 acres
"	IV - Non-Productive	= 20 acres

On areas where groups are intermixed and highly important to big game, mapping will be as a mosaic, i.e., CN-4 (20%), NO-1 (20%), NP-R (60%).

Table 2
Color Classification Code

<u>Classification</u>	<u>Color Name</u>	<u>Dixon No.</u>
CN-1	Pink	322
CN-2	Lake Red	321-1/2
NC-3	Terracotta	351
CN-4	Purple	323-1/2
CN-4T	Purple	323-1/2 Double crosshatch
CN-4R	Purple	323-1/2 Single hatch
CN-5	Light Green	354-1/2
CN-5S	Light Green	354-1/2 Double crosshatch
CN-5P	Light Green	354-1/2 Single hatch
HD	Yellow Ochre	324-1/2
HD-S	Azure	320-1/2
NO	Yellow	353-1/2
NP	Uncolored	

CHAPTER III

ANALYSIS OF VEGETATION FOR ECOLOGICAL CHANGES AND INCORPORATION INTO THE TOTAL RESOURCE INFORMATION SYSTEM

On the Willamette Forest, the following measurements will be taken on all vegetation: species, frequency, size (height), density (crown cover percent), arrangement, productivity in numbers per acre, kinds of animals, amount and season of use, percent available to big game animals, and condition.

Measurement of nonvegetation will include: logs and stumps - their number, height, and percent cover, number of gopher mounds; and percent of area of skid trails, spur roads, etc. Deer and elk-pellet groups will be taken to determine time of use and relative amount of acceptability by the animals.

From this data we will have a good description of the vegetation and factors which will affect management of the area. For example, the pre-cut vegetation can indicate: the post-cut vegetation and its value to wildlife, competition to regeneration, animal response, and potential problems for regeneration of desirable plants.

The method recommended to sample vegetation is to take 1/250-acre plots at the rate of 10 to 20 plots per 40 acres. Two or more 1/50-acre plots will be needed to determine the number of large trees or stumps per acre. Growth basal area on the 15 and 10 ring per inch standard will be determined on 25% of the plots. Site index, slope, exposure, elevation, operability, usability and slope shape (Willamette soil number) will be determined for the cell. The forms to be used are Project Area Map (R6-5400-11 or -11A), Individual Vegetation Analysis Plot, Vegetation Analysis Summary Sheet, and Per Acre Description of Vegetation.

Not all data on plant species or nonvegetation can be recorded in each column on the forms. The basic principle here is to record the data which will aid in making management decisions for this acre of land. Before leaving the cell being sampled, complete the individual plot forms, map and heading on the Per Acre Description of Vegetation Form.

List of Equipment for Circular Plots

1. Jake Staff with top.
2. Tape with ring so can rotate on the Jake Staff to mark the outer boundary of the plot.

For a 1/300-acre plot, the radius is 6.8 feet (2.07 meters)

For 1/250-acre plot, the radius is 7.45 feet (2.27 meters)

For 1/50-acre plot, the radius is 16.6 feet (5.60 meters)

3. Tatum or clipboard - one-half size can be used.
4. Pencils.
5. Forms (TRI Map Form and Vegetation Analysis Plot).

6. Clinometer, compass, maps (Topographic, District, TRI Compartment Mosaic).
7. Altimeter (optional).
8. Manual of Oregon Trees and Shrubs by Oregon State University Press.
9. Pocket tape of carpenter's folding ruler marked in tenths of inches or centimeters for measuring annual growth.

Instructions for Completing the Vegetation Analysis Plot Form (Figure 5)

Heading

TRI# - Record the Compartment number, Cell number, Grid number.

District - Ranger District

Unit - Use timber sale unit name; i.e., "Box Canyon #3" or map name H4D or R121.

T - Township

R - Range

S - Section

Sub - 16th part of section or lot #.

By - Name of examiner (full on first sheet, initials on remainder)

Date - Month/Day/Year plot taken

Stage - Per ecological classification standards: CN-1 = CN = Conifers; 1 = Stage 1, etc.

Plot Size - 1/50 - 1/250 - or ??

Plot # - Plot Number

Column (from left to right)

- (1) Species - Indicate species common name.
- (2) Species - Alpha symbol of the scientific name listed in Research Paper PNW 40. If species is not known, record description in "Remarks" column. Group species by type; i.e., trees, shrubs, forbs, grasses.
- (3) Height in Feet - Height of plants in feet to nearest half-foot, plus last year's growth in inches for trees and designated shrubs in the "Remarks" column. Designated shrubs for the Willamette are:

Ceanothus (three species), dogwood (two species), vine maple, madrone, chinquapin, hairy manzanita, silk tassel, ocean spray and willow.

If species occur at two distinct heights, such as seven feet and two feet (7' and 2'), maintain separate line entries.

(4) Percent Cover - Estimate the percent of ground cover by extending a vertical line from the plant perimeter to the ground. In many cases, there will be several layers of vegetation with each capable of totaling 100%. Plants with less than one percent (1%) record as "Trace" (T).

Table 3

Percent Cover - Diameter Relationships
1/250 Acre (174.2 sq.ft.)

<u>Percent Cover</u>	<u>Diameter in Inches</u>	<u>Centimeters</u>
1%	17.9"	45
5%	40.0"	101
10%	56.5"	144
25%	89.4"	227
100%	14.9'	453

(See Table 4 for additional percent cover/diameter relationships.)

For measuring crown intercept of trees, use a 90 degree clinometer to determine the outer edge of the crown.

(5) No. - Number of plants, deer or elk pellet groups, logs, stumps, and gopher mounds, etc. For species with large number, count those in one quarter and multiply by the number of filled quarters. Those with extreme numbers (e.g., sod grasses) or in vine form (blackberry), use a dash (--) or estimate pounds per plot.

For plants where the base is outside of the plot, but crown does cover part of the plot, use "-0-" in the "number" column and record cover in "% Cover" column. Trees occurring outside the plot is an example of these conditions.

(6) Avail. - Estimate the percent available to big game animals. Generally, this is the easily reached perimeter of the plant below five feet. (Example: Use 100% for "All Available," and "0" for "None Available.")

(7) Am't Use - In this column, indicate amount of use, agent doing the use and time of year.

(a) Indicate the cause of use; i.e., based on two letters:

BB - Black Bear	FR - Frost	PG - Pocket Gophers
BG - Big Game (Elk & Deer)	GR - Grouse	PO - Porcupine
BI - Birds	GS - Grd. Squirrel	QU - Quail
BR - Blister Rust	HO - Horses	RB - Rabbits
BV - Beaver	HU - Humans	RC - Raccoon
CA - Cattle	IC - Ice	SH - Sheep
CH - Chipmunk	IN - Insects	SN - Snow
DE - Deer	MA - Machines	SW - Shrews
DI - Disease	MI - Mice	TS - Tree Squirrel
DR - Drought	MB - Mtn. Beaver	UN - Unknown
EL - Elk	MU - Mules	WB - Windburn
FL - Flooding	MV - Meadow Vole	WR - Wood Rat

(b) Indicate the amount of use of the current year's growth:

N - No apparent use or damage

L - Light Use (0% to 20% of available current year's growth removed)

M - Moderate Use (21% to 50% of available current year's growth removed)

H - Heavy Use (50% or more of available current year's growth removed)

E - Extreme Use (100% of annual growth, plus part of preceding year's growth)

(c) Indicate the time of year for use:

W - Winter

S - Spring

Y - Year Around

M - Summer

F - Fall

P - Past Use Not Current

D - Dual (Spring-Fall)

(8) Remarks - Enter here the last completed annual growth, in inches, of the designated plants (See #3 above). (During growing season of April through July, record the previous year's growth.)

Record letters to describe unknown plants in "Species" column; for example, O-L-F-WF, followed by a full description in "Remarks" column.

O - Opposite Branching

L - Low Shrub

F - Fuzzy Leaf

WF - White Flowers

(This plant is "Whipple vine" or "Whipplea.")

Collect a sample and after identification enter correct name.

Instructions for Completing Vegetation Analysis Summary Sheet (Figure 6)

Heading

TRI # - Record the Compartment number, Cell number, Grid number.

District - Ranger District

Unit - Sale area name or map symbol of the unit.

T - Township

R - Range

S - Section

Sub - 16th portion of Section or Lot #

Examiner - Full name on first sheet; initials thereafter

Date - Date the information was recorded on the plot form.

Stage - Per ecological classification standard; i.e., CN-2 = Conifer - Stage 2.

Plot Size - 1/50, 1/250, etc.

Spp - Species: Top line for common name, bottom line for Alpha symbol.

Nonvegetation will be entered by crossing out Spp and using top line.

On the same sheet, it is more meaningful to group plants by trees, shrubs, grass and forbs. Nonvegetation should be grouped separately.

Column

- (1) Plot #1 - Enter date from plot form on same pre-numbered line; i.e., Plot #1 data goes on Line #1 - Plot #10 on Line #10.
- (2) Height - Enter heights of plants. Total the height (multiply height by the number of plants; i.e., 10 plants 6' high = 60) and divide by number of plants--not by total number of plots.

$$\frac{\text{Total Height}}{\text{Total Plants}} = \text{average (If 2.5', record as 2')}$$

If plants have been listed at two different heights, use separate columns and determine the respective average heights of each.

- (3) % Cover - Record data from plot record form. Add, and divide by total number of plots. If average is 2.5%, record as 2%.
- (4) No. - Enter number of plants of this species by plots. Total at the bottom and determine the average (to one decimal place), dividing by the total number of plots taken in the cell.

$$\frac{\text{Total Number of Plants}}{\text{Total Number of Plots}} = \text{Average}$$

Multiply this average by 250 (if 1/250 plots taken) to determine the total number of plants per acre.

To determine the number of deer-day or elk-day use per acre: Total the number of pellet groups; divide by the number of plots to three decimal places for average; multiply average by 250; then divide by 13 (daily rate of big game defecation).

Example:

$$\begin{aligned} \text{Total plots} &= 25 \\ \text{Total pellet groups} &= 19 \end{aligned}$$

$$\frac{19}{25} = 0.76$$

$$0.76 \times 250 = 190 \text{ pellet groups per acre}$$

$$\frac{190}{13} = 14.6, \text{ or } 15 \text{ deer- or elk-day use per acre.}$$

To convert elk-day use to deer-day equivalents, multiply by 3.5

- (5) % Available - Percent available; record data from plot record form. Add, and divide by number of entries.
- (6) Use - Record kind of animal, percent and season data from plot record. Summarize, using judgment.

Remarks - Enter any additional information required to describe the vegetation in the area sampled.

Instructions for Completing Form Per Acre Description of Vegetation
 TRI # (Figure #7)

This form places all the information from the Vegetation Analysis Summary Sheet by species in a manner that it can be inserted into the TRI System (Form R6-6600-601, 2/71 Figure 8).

Heading

TRI # - Record the Compartment number, Cell number, Grid number.

District - Ranger District name and #.

Unit - Sale area or unit name or number.

T-R-S-Sub. - Township, Range, Section and Sub-Section.

Examiner - Full last name.

Date - Date the plot information was taken in field.

Stage - Per wildlife ecological classification.

Plot Size - 1/50, 1/250

No. of Plots - Enter number of plots taken.

Slope Shape - Convex, concave, etc.

Willamette Type # - From Willamette Soils Description by Lew Manhart, 1971.

Site Index - From a site tree or sale information.

GBA - Growth Basal Area computed from measurements on the cell.

Percent Slope - Percent slope from plot date or map.

Exposure - From observation or map

Elevation - From map or altimeter

Site Condition - See TRI Handbook 2109.21 R6, January 1971

Operability - See TRI Handbook 2109.21 R6, January 1971

Usability - See TRI Handbook 2109.21 R6, January 1971

Columns (left to right across top of form)

1. Species or Items - Species name.
2. Alpha Code (PNW Research Paper 40).

3. No. plots Occurred On - Count the number of plots from the Vegetation Analysis Summary Sheet on which this species occurred.

Data for the following columns will come from the per acre line on the bottom of the Vegetation Analysis Summary Sheet. Refer to TRI System Instructions for the number of letters or spaces available for each column.

4. Height (Size Class) - Record average height for the unit.
5. Percent Canopy Cover (Density) - Record percent ground cover per acre.
6. Arrangement - From TRI System

G - Grouped or in clumps on one end of plot.

L - Linear distribution

K - Key species

W - Well distributed

M - Mosaic, uniform groups throughout the plot.

7. Number per Acre - Stem Density (Productivity) - Enter number of plants per acre. Proposed for the TRI System:

9T for 9 per acre

99T for 99 per acre

99C for 990 per acre

1M for 1,000 per acre

99M for 99,000 per acre

8. Kind Animal - Enter symbols from TRI Handbook.

9. Amount Use - Enter the average percent of use or damage per acre.

10. Season of Use - Enter the season used the most or combination of seasons

11. Condition - U - Unsatisfactory or S - Satisfactory and a single digit to describe hedging:

0. Not used
1. All available, light hedging
2. All available, moderate hedging
3. All available, close hedging
4. Partly available, light hedging
5. Partly available, moderate hedging
6. Partly available, close hedging

Use data from percent available and amount use to determine the above codes.

Under Tree Vegetation:

12. Class - M = Mature, I = Immature - refer TRI Handbook.
13. DBH - Average = Average of dominants.
14. BA = Basal Area - Use data from Growth Basal Area determination.

Activities Block - Refer to TRI Handbook:

15. Microfilmed - Enter activities which are completed such as HCC for clearcut. Active ones are indicated in Period as ACT.
16. Prescribed - Those activities prescribed, such as suitable for vegetating with desireable legumes and grasses.

Field Examination:

17. Completed - Enter type exams completed and when microfilmed.
18. Planned - Enter type of exam and period planned.
19. Growth Basal Area Standard - Enter if other than 15 rings per inch.

Animal Use Patterns - Indicate type of animal use and amount.

On the map show travel routes and note on form how the area is used. Also show any feed differences noted within the unit. If data on deer counts is available from Oregon State Game Commission, enter here. Enter notes on key areas within cell; i.e., salt licks, calving areas, feed area, cover area during deep snows, etc.

CHAPTER IV

PARTIAL LIST OF PLANT SPECIES ON THE WINTER RANGE IN THE WILLAMETTE N.F.

<u>Species</u>	<u>Alpha Symbol</u>	<u>TRI Symbol</u>	<u>Recording Instructions</u>
<u>TREES</u>			
Alder, Red	Alrv	RA	Record annual growth of
Cedar, Incense	Liboc	IC	tallest tree (under 20
Cedar, Western red	Thpl	C	feet) on the plot. This
Chinquapin, Golden	Cach	GC	will assist in determin-
Cottonwood, Black	Potr	BC	ing competition, plantation
Douglas-fir	Psmem	DF	damage and remedial
Hemlock, Western	Tshe	H	measures.
Madrone	Arme	MD	
Maple, Big leaf	Acma	M	Record average annual
Pine, Ponderosa	Pipo	P	growth (RAAG) by plot
Pine, White	Pimo	W	on sprouts and plants
Pacific yew	Tabr	Y	under 6 feet.
<u>SHRUBS</u>			
<u>Berries:</u>			
Blackberry, trailing	Ruma		
Blue elderberry	Sayl		
Red elderberry	Saca		
Huckleberry	Syal		
Raspberry	Rule		
Serviceberry	Amal		RAAG
Thimbleberry	Rupa		
Trailing snowberry	Symoh		
Bitter cherry	Prem		
Ceanothus, Deerbrush	Cein		RAAG
Ceanothus, Red stem	Cesa		RAAG
Ceanothus, Showbrush	Ceve		RAAG
Chinquapin (brush form)	Casta		RAAG
Dogwood, Pacific	Conu		RAAG
Dogwood, Red Osier or Creek	Cost		RAAG
Douglas maple	Acgld		
Grape, Oregon	Berbe		
Grape, Tall Oregon	Beaq		
Grape, Cascade Oregon	Bene		
Hazel	Coco		
Manzanita, Hairy	Arco		RAAG
Manzanita, Pinemat	Arne		
Manzanita, Kinnikinnick	Aruv		
Manzanita, Green	Arpa		

<u>Species</u>	<u>Alpha Symbol</u>	<u>TRI Symbol</u>	<u>Recording Instructions</u>
Maple, Vine	Accl		
Maple, Douglas	Acgld		
Ocean spray	Hodi		RAAG
Poison Oak	Toxic		
Rhododendron	Rhodo		
Ribes	Ribies		
Rose	Rosa		
Salal	Gash		
Salal, Dwarf, Wintergreen	Gouv		
Silktassel	Garry		RAAG
Snowberry, trailing	Symoh		
Vine maple	Accl		RAAG
Whipple vine	Whmo		
Willow	Salix		RAAG

HERBACIOUS

Forbs

Beargrass	Xete
Birdsfoot trefoil	Loco
Canadian Thistle	Ciar
Clover, White Dutch	Trre
Common pearly everlasting	Anma
Fern, bracken	Pteri
Fern, sword	Pomu
Fireweed	Epan
Goatweed	Hypr
Iris	Iris
Lettuce, prickley	Lase
Moss	Moss
Oregon oxalis	Oxer
Peavine	Lathy
Strawberry	Fraga
Thistle Bull	Cila
Thistle, Canadian	Ciar
Trillium	Trill
Twinflower	Libol
Vanilla leaf	Actr
Vetch	Vicia

Grasses

Fescue, Alta	Fear
Fescue, Idaho	Feid
Fescue, Red	Feru
Fescue, Green	Fevi
Hairgrass, Slender	Deel
Hairgrass, Tufted	Deca
Highland bent grass	Agted

<u>Species</u>	<u>Alpha Symbol</u>	<u>TRI Symbol</u>	<u>Recording Instructions</u>
Kentucky bluegrass	Popr		
Onion grass	Melic		
Orchard grass	Dagl		
Redtop	Agal		
Rye, Annual	Lomu		
Rye, Blue wildrye	Elgl		
Rye, Perrenial	Lope		
Sedge	Carex		
Velvet grass	Hola		

TABLE 4

Number of Plants by Diameter
to Equal 1%, 3%, 5%, 7%, or 10% on 1/250 Plot

Diameter Inches	Centimeters	Percents				
		1%	3%	5%	7%	10%
1	2.5	320	960	1,600	2,200	3,200
2	5.1	79	237	398	553	790
3	7.6	35	105	177	245	350
4	10.2	20	60	100	140	200
5	12.7	13	38	64	90	128
6	15.2	9	26	44	62	88
7	17.8	6	20	33	46	65
8	20.3	5	15	25	35	50
9	22.9	4	12	20	28	40
10	25.4	3	10	16	22	32
11	27.9	3	8	13	18	26
12	30.5	2	7	11	15	22
13	33.0	2	6	9	13	19
14	35.5	2	5	8	11	16
15	39.4	1	4	7	10	14
16	40.6	1	4	6	8	12
17	43.2	1	3	6	8	11
18	45.7	1	3	5	7	10
20	50.8	1	2	4	6	8
30	76.2	-	1	2	2	4
40	101.6	-	-	1	1	2

FIG. I PRESENT HARVEST PATTERN

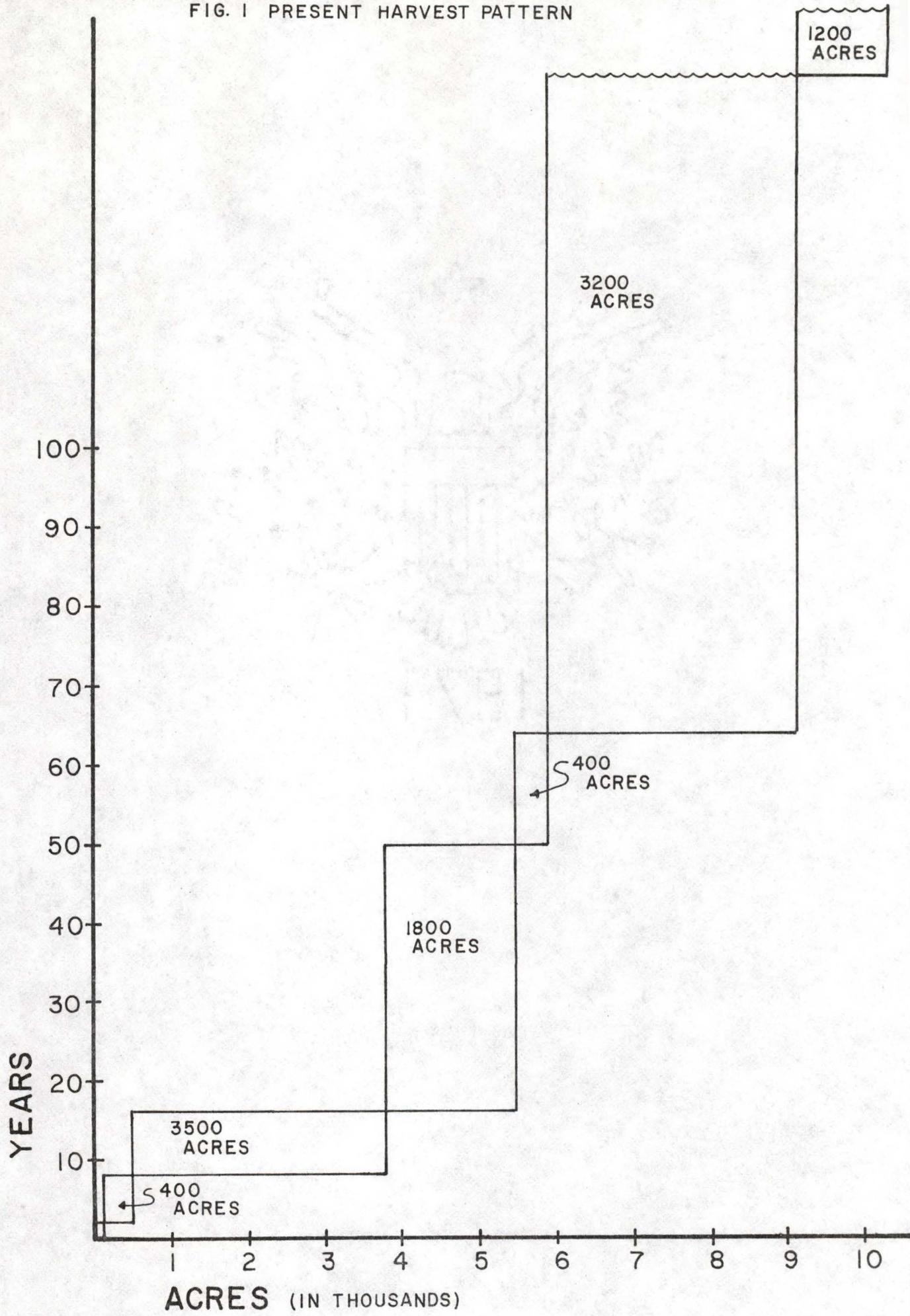


FIG. 2 HARVEST PATTERN IN TWENTY YEARS

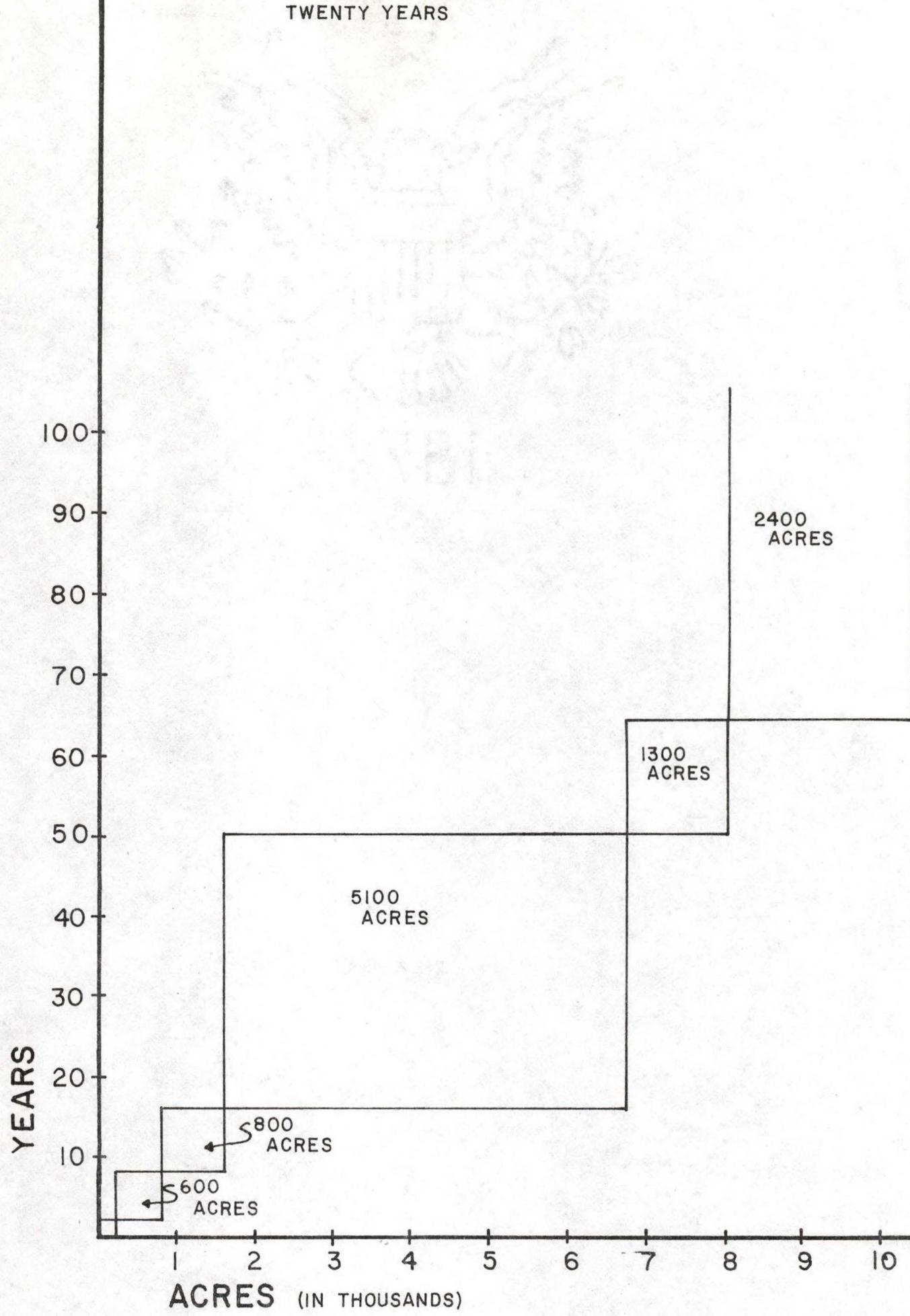
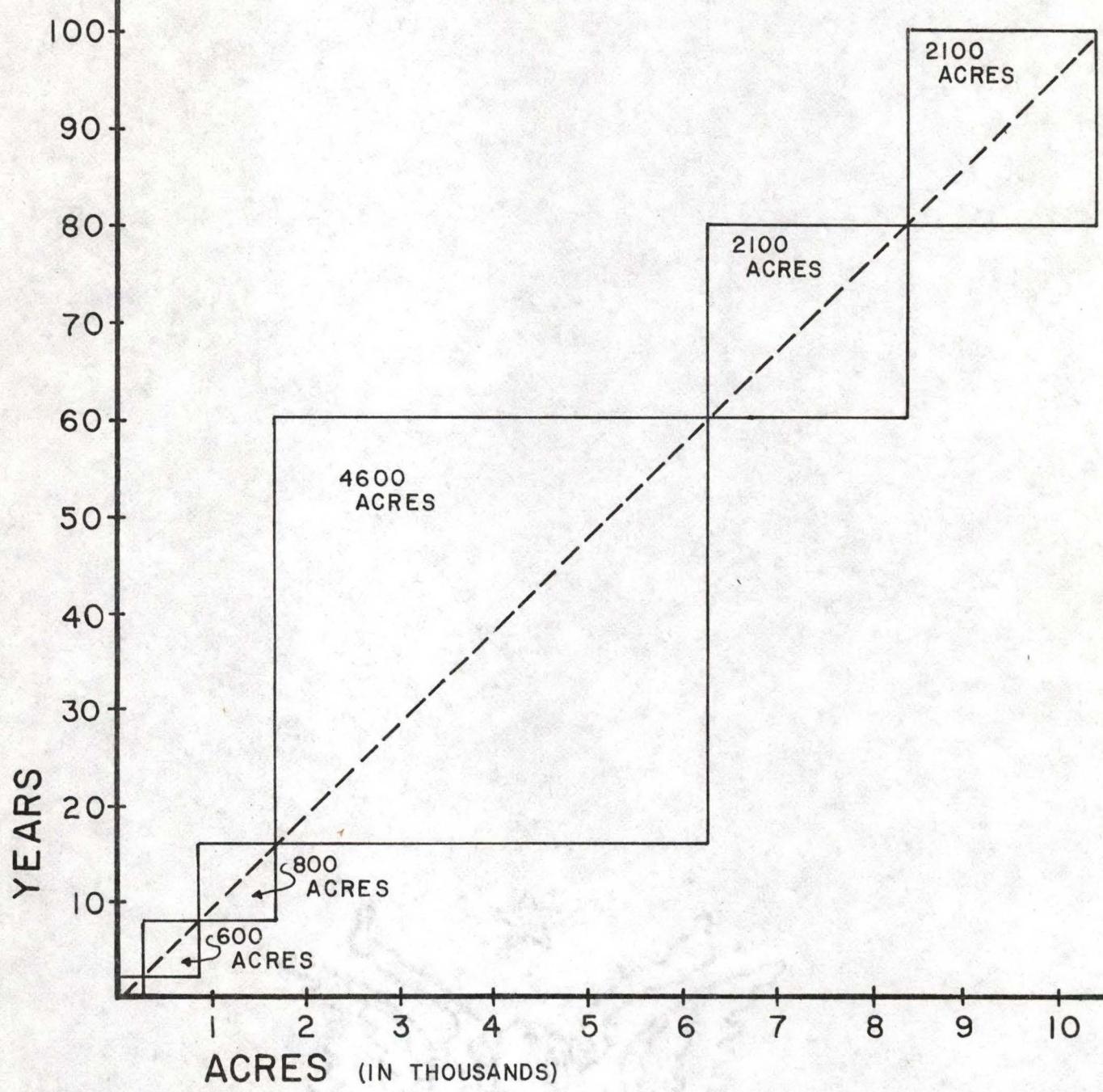


FIG. 3 IDEALIZED 1% OF AREA HARVESTED PER YEAR



IDENTITY	COMPARTMENT NAME	COMPT. No.
	CELL NOS.	
	X-REF. COMPT. NAMES	
	X-REF. COMPT. NOS.	
	X-REF. CELL NOS.	
	TWP.	NORTH 
	RANGE	
	SCALE - MILES	
	0	IN. = 1 MILE
	PROJECT NAME	
UNIT NO.	ACRES	
SITE	SLOPE	
	EXPOSURE	
	ELEVATION	
	SITE	
	SOIL	

Vegetation Analysis Plot Record

District _____ TRI # _____

Unit _____ T _____ R _____ S _____ Sub _____

Vegetation Analysis Plot Record

District _____ TRI # _____

Unit T R S Sub

Vegetation Analysis Summary Sheet

TRI # _____

District _____ Unit _____ T _____ R _____ S _____ Sub _____

Examiner _____ Date _____ Stage _____ Plot Size _____

Spp: _____ Spp: _____ Spp: _____ Spp: _____

Plot No.	Ht	% Co- ver	No.	% Avai- able	Use	Ht	% Co- ver	No.	% Avai- able	Use	Ht	% Co- ver	No.	% Avai- able	Use	Ht	% Co- ver	No.	% Avai- able	Use
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
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19																				
20																				
21																				
22																				
23																				
24																				
25																				
Total																				
Avg.																				
P/Ac																				

Remarks:

District _____ Unit _____ T _____ R _____ S _____ Sub _____ Examiner _____ Date _____

Stage _____ Plot Size _____ # Plots _____ Slope Shape _____ Will. Type # _____ Site Index _____

GBA % Slope Exposure Elevation _____ Site Condition _____ Operability _____ Usability _____

TRI SYSTEM MASTER COMPUTER FILE

NF BA xx	NF NAME	RANGER DISTRICT	NAME AND NUMBER	TOTAL MAP ACRES	ACRE FACTOR	RUN DATE	PERIOD
COMPT. NO. BB xxxxx	COMPT. NAME	BC	BG BH BI BJ BK BL BM BN BO BO BP BO	BD	BE		BF xx
	19 LETTERS MAX.	xxxx	xxxx	xxxx	xxxx	xxxx	

CELL NO.	GRID IDENTITY	SQUARE INCHES	CELL ACRES	OWNERSHIP	ENCUMBRANCES	MINERALS	LAND TYPE	SOIL TYPE	SITE INDEX	GROWTH BA	PERCENT SLOPE	EXPOSURE	ELEVATION	SITE CONDITION	OPERABILITY	USABILITY	FUEL TYPE
xxx	xx	xxx	xxxxx	x	x	x	x	xxxxx	xx	xx	xx	xx	xxxxx	x	x	x	xx

DA	DB	DC	DD DE DF DC	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ
----	----	----	-------------	----	----	----	----	----	----	----	----	----	----

TYPE OF ACTIVITY COMPLETED AND ACTIVE	PERIOD ACTIVITY RECORD MICROFILMED	TYPE OF ACTIVITY PRESCRIBED	PERIOD PRESCRIBED ACTIVITY TO BEGIN	TYPE OF FIELD EXAMINATION COMPLETED	PERIOD FIELD EXAMINATION RECORD MICROFILMED	TYPE OF FIELD EXAMINATION PLANNED	PERIOD FIELD EXAMINATION TO BE MADE
xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
KA	KB	KC	KD	KE	KF	KG	KH
LA	LB	LC	LD	LE	LF	LG	LH
MA	MB	MC	MD	ME	MF	MG	MH
NA	NB	NC	ND	NE	NF	NG	NH
OA	OB	OC	OD	OE	OF	OG	OH

xx

GROWTH BA STANDARD (PA) IF OTHER THAN 15 R.P.I.

DA	DB	DC	DD DE DF DC	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ
----	----	----	-------------	----	----	----	----	----	----	----	----	----	----

TYPE OF ACTIVITY COMPLETED AND ACTIVE	PERIOD ACTIVITY RECORD MICROFILMED	TYPE OF ACTIVITY PRESCRIBED	PERIOD PRESCRIBED ACTIVITY TO BEGIN	TYPE OF FIELD EXAMINATION COMPLETED	PERIOD FIELD EXAMINATION RECORD MICROFILMED	TYPE OF FIELD EXAMINATION PLANNED	PERIOD FIELD EXAMINATION TO BE MADE
xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
KA	KB	KC	KD	KE	KF	KG	KH
LA	LB	LC	LD	LE	LF	LG	LH
MA	MB	MC	MD	ME	MF	MG	MH
NA	NB	NC	ND	NE	NF	NG	NH
OA	OB	OC	OD	OE	OF	OG	OH

xx

GROWTH BA STANDARD (PA) IF OTHER THAN 15 R.P.I.

DA	DB	DC	DD DE DF DC	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ
----	----	----	-------------	----	----	----	----	----	----	----	----	----	----

TYPE OF ACTIVITY COMPLETED AND ACTIVE	PERIOD ACTIVITY RECORD MICROFILMED	TYPE OF ACTIVITY PRESCRIBED	PERIOD PRESCRIBED ACTIVITY TO BEGIN	TYPE OF FIELD EXAMINATION COMPLETED	PERIOD FIELD EXAMINATION RECORD MICROFILMED	TYPE OF FIELD EXAMINATION PLANNED	PERIOD FIELD EXAMINATION TO BE MADE
xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
KA	KB	KC	KD	KE	KF	KG	KH
LA	LB	LC	LD	LE	LF	LG	LH
MA	MB	MC	MD	ME	MF	MG	MH
NA	NB	NC	ND	NE	NF	NG	NH
OA	OB	OC	OD	OE	OF	OG	OH

xx

GROWTH BA STANDARD (PA) IF OTHER THAN 15 R.P.I.

CELL SPECIAL IDENTITY	DIRECTION	TREE CLASS	MAJOR SPECIES	MINOR SPECIES	AVERAGE DBH OR SIZE	TREES PER ACRE	DISTRIBUTION BA PER ACRE	BA PER ACRE	YEAR OF ORIGIN	MISTLETOE	DAMAGING AGENT	GROUND VEGETATION SPECIES	SIZE CLASS	DENSITY	ARRANGEMENT	PRODUCTIVITY	KIND ANIMAL	AMOUNT USE	SEASON USE	CONDITION
xxx	xxx	M	EC	ED	EE	EF EG	EH	EI	EJ	EK	EL	EM EN	EO EP	EQ	ER	ES	ET	EU		
FA	FB	I	FC	FD	FE	FF FG	FH	FI	FJ	FK	FL	FM FN	FO FP	FQ	FR	FS	FT	FU		
GA	GB	C	GC	GD	GE	GF GG	GH	GI	GJ	GK	GL	GM GN	GO GP	GQ GR	GS GT	GU				
HA	HB	E	HC	HD	HE	HF HG	HH	HI	HJ	HK	HL	HM HN	HO HP	HQ HR	HS HT	HU				
IA	IB	X	IC	ID	IE	IF IG	IH	II	IJ	IK	IL	IM IN	IO IP	IQ IR	IS IT	IU				
JA	JB	D	JC	JD	JE	JF JG	JH	JJ	JK	JL	JM JN	JO JP	JQ JR	JS JT	JU					

TOTALS

EA	EB	M	EC	ED	EE	EF EG	EH	EI	EJ	EK	EL	EM EN	EO EP	EQ	ER	ES	ET	EU
FA	FB	I	FC	FD	FE	FF FG	FH	FI	FJ	FK	FL	FM FN	FO FP	FQ	FR	FS	FT	FU
GA	GB	C	GC	GD	GE	GF GG	GH	GI	CJ	GK	CL	GM GN	GO GP	GQ GR	GS GT	GU		
HA	HB	E	HC	HD	HE	HF HG	HH	HI	HJ	HK	HL	HM HN	HO HP	HQ HR	HS HT	HU		
IA	IB	X	IC	ID	IE	IF IG	IH	II	IJ	IK	IL	IM IN	IO IP	IQ IR	IS IT	IU		
JA	JB	D	JC	JD	JE	JF JC	JH	JJ	JK	JL	JM JN	JO JP	JQ JR	JS JT	JU			

TOTALS

EA	EB	M	EC	ED	EE	EF EG	EH	EI	EJ	EK	EL	EM EN	EO EP	EQ	ER	ES	ET	EU
FA	FB	I	FC	FD	FE	FF FG	FH	FI	FJ	FK	FL	FM FN	FO FP	FQ	FR	FS	FT	FU
GA	GB	C	GC	GD	GE	CF GG	CH	CI	GJ	GK	CL	GM GN	GO GP	GQ GR	GS GT	GU		
HA	HB	E	HC	HD	HE	HF HG	HH	HI	HJ	HK	HL	HM HN	HO HP	HQ HR	HS HT	HU		
IA	IB	X	IC	ID	IE	IF IG	IH	II	IJ	IK	IL	IM IN	IO IP	IQ IR	IS IT	IU		
JA	JB	D	JC	JD	JE	JF JC	JH	JJ	JK	JL	JM JN	JO JP	JQ JR	JS JT	JU			

TOTALS

TOTAL CELL ACRES	% DIFF. CELL ACRES/MAP ACRES	TOTAL CELL SQ. INCHES	TOTAL NO. CELLS	
------------------	------------------------------	-----------------------	-----------------	--